

How long would it take a photon to travel the width of the Universe?

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Infinitely long! Literally.

That is, the photon will travel forever through the Universe until it is absorbed by some object. This follows from the simple fact that the universe must be infinite in time and space.

The infinity of the Universe strictly follows from the fact that it cannot have "the edges of the Universe". By definition. Neither spatial nor temporal, there is no edge. This prohibits Einstein's STR. "Edge of the Universe" is absurd and nonsense.

If we assume that the Universe is finite, then we will get a "final pie" and not the Universe, since then there must necessarily be an "edge of the Universe" (the edge of the pie). That is, the place where the space-time continuum ends. It's scary to even write this. This interpretation of the structure of the Universe is a typical manifestation of the theory of the ether in the modern interpretation. Note that the microwave background exists at any point in the Universe, and not only "at the edge of the Universe" ... You can read about the "edge of the Universe" by following the links [1].

When the photon moves, it will simply overcome space. And no more. And notice that the photon does not age and does not travel backward in time. Science has already overcome the aging of a photon in its development.

We especially note that from the point of view of a photon, time still flows. This strictly follows from the fact that there is the de Broglie duration of the photon oscillation [2]:

$$E = h * \gamma = m * c^2$$

$$\gamma = (m * c^2) / h$$

$$\Delta t_0 = 1 / \gamma = h / (m * c^2)$$

From the fact of these oscillations, waves of matter strictly follow, that is, de Broglie waves (this is how Louis de Broglie himself came to them). Consequently, the photon still "sees" time! He also "sees" our Universe in all its glory.

If there was a complete time dilation for the photon (after all, it still moves with the speed of light), then the oscillation would not have been possible. That is, the photon would not exist. But, a miracle happens: the photon moves at the speed of light, and at the same time, obviously, there are de Broglie oscillations with a certain duration in time (normal, standard duration!). And this means

only one thing: time flows in the photon's own frame of reference. Why is this happening is a big question! And it is clearly logically related to the number 137. In general, you need to understand this... All the same, the old school of physics is right: the number 137 is really a magic number...

1. Bezverkhniy V. D. Bezverkhniy V. V. CMB, A. Einstein's STR, “Nothing” and Big Ben. SSRN Electronic Journal (October 2019). DOI: 10.2139/ssrn.3457575.
<https://dx.doi.org/10.2139/ssrn.3457575> , <https://vixra.org/pdf/1909.0434v1.pdf>
2. Bezverkhniy V. D. Bezverkhniy V. V. What is the most precise definition of time?
DOI: 10.13140/RG.2.2.27158.37445.
https://www.researchgate.net/publication/344876759_What_is_the_most_precise_definition_of_time
3. Quora: How long would it take a photon to travel the width of the Universe?
<https://qr.ae/pNU6Uq>